MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

TO: John Shaffer, Chief, Hazardous Materials Evaluation Unit

FROM: Mark Lowing MEL

DATE: May 15, 1980

SUBJECT: Chem-Met Services, Wyandotte

Introduction

Chem-Met Services, Inc. has been processing chemical waste in Wyandotte, Michigan since 1966 (see location on map, Fig. 2 attached). The process involves a chemical reaction wherein metallurgical limestone flue dust is reacted with water, acids, oils, paint residues, and various other organic solvents and compounds. The resulting reaction yields a solid residue called "chem-pac". This solid residue is stockpiled on site and is used to mix with organic waste solvents and sludges. The resulting waste material is disposed of at Wayne Disposal by landfill.

Purpose

The processing and disposal of hazardous wastes in Michigan are subject to approval by the Department of Natural Resources. The Departmental approval is contingent upon approval from the Divisions that feel a need to monitor or control the activities at a facility that handles hazardous wastes. It is the purpose of this memo to initiate comments and recommendations, with regard to air quality concerns at Chem-Met that are addressed herein. This is necessary in order to determine if Air Quality Division staff feel a need for future involvement in the Departmental approval system (Act 64) or see a need for control with respect to Act 348.

Description

Figure 1, attached, is a process flow diagram of Chem-Met Services operation. This diagram will serve as a visual description of the overall process, thus avoiding a written one. The following discussion will, therefore, concentrate on the individual components in the process and address air emissions that may be associated with them. See Table 1 for a list of the components in Figure 1.

1. Liquid Waste Storage Pond -

   This open air pond contains an estimated 200,000 gallons of liquid waste which are fed to it by liquid tank trucks. The major component of the waste is water contaminated with oils and acids. Other miscellaneous wastes may also enter here. Table 2, attached, is a list of some miscellaneous wastes approved to be processed at Chem-Met by Oil and Hazardous Material Control Section, Water Quality Division. Of major concern with regard to air quality is the evaporative emissions to the atmosphere of freon, methylene chloride, solvent wastes, and sulfuric acid present in the water contaminated waste.

2. Lime Flue Dust Silo, Flue Dust Baghouse -

The lime flue dust is pneumatically loaded into the top of the silo. An air relief pipe transmits the evacuated dust-laden air to a baghouse. The air-to-cloth ratio is good, so emissions of lime dust should be under control, provided proper maintenance of the baghouse is observed. Wayne County Pollution Control has issued a permit to Chem-Met for the operation of this equipment.

3. Pug Mill -

This is where the mixing of the lime flue dust and liquid waste occur. See Table 3 for lime flue dust composition and reactions that are occurring. Approximately 100 - 150 tons of lime flue dust are mixed here with 50,000 gallons of liquid waste each 8-hour day. The uncontrolled addition of lime at this point to the pug mill may result in the fugitive emissions of lime to the air.

4. Reacting Mixture -

This is the material that flows out of the pug mill and onto the ground. An exothermic reaction takes place after the mixing and lasts for approximately 30 minutes, generating enough heat to raise the temperature of the material to 245°F. Table 3 lists what is considered to be the two primary reaction pathways, although others are also occurring. Because of the high temperature of reaction, some of the liquid is evaporated or boiled off before it has a chance to react. This results in a visible emission to the air that may potentially contain any of the liquid components present in the waste.

5. Stockpile of Reacted Mixture -

Once the reaction of the mixture is near completion or finished it is transported to the stockpile hill. At this point the material dries before it is used again. This results in a semi-sand powder mixture. From Table 2 it was found that some asbestos and other stable compounds such as halogenated flame retardants and tris (beta chloroethyl phosphate) were present in waste accepted at Chem-Met. This mixture will also contain some lime, which is very reactive with water and may cause problems for those who breathe it. As a result, fugitive emissions from this stockpile would cause a potential air quality problem.

6. Paint Solvent Waste -

The reacted mixture still contains some lime which did not react completely after going through the pug mill. Since this is the case, the reacted mixture is further used to process paint and solvent waste. This is done by digging pits in the hill and bulk loading the liquid waste into them. The reacted mixture is then filled into the pits and mixed with the liquid until it is absorbed. Liquid waste contained in drums are crushed and the liquid contents are soaked up by the reacted mixture. Since this process may take several days or longer, there is ample time for liquid solvents to be evaporated. This area also contains free-standing liquid run-off and has a very noticable odor.

7. Leachate Storage Pond -

This pond contains run-off from the stockpile hill of reacted mixture. Since there are paint solvent wastes present in the stockpile, some of this liquid ends up in the leachate pond, along with rain water. This liquid is then fed into the pug mill along with the other liquid waste. Evaporative emissions from this pond are occurring as judged by the strong odors emanating from it.

Conclusion

It is difficult at this time to determine if additional control measures are needed at Chem-Met. This is the result of the fact that there are no volatile organic hydrocarbon standards for this type of process. It is also difficult to document the emissions without monitoring equipment. It should be noted that there is documentation, from Table 2, that Chem-Met has received two materials listed on the Air Priority List, formaldehyde and asbestos. This alone is cause for looking very closely at this process.

Chem-Met Services process was designed to handle wastes containing water or sulfuric acid. Through the years they have begun handling solvents and other type wastes that do not combine chemically with the limestone flue dust to form an insoluble, inert material as was originally planned. As a result, a sizable portion of the waste that is treated here either is absorbed by the "chem-pac" material and landfilled or is released as volatile emissions to the atmosphere.

Recommendation

The effectiveness of disposing of waste by absorbtion and volatilization is questionable and I would not recommend such a practice.

In order to reduce or eliminate the concerns that have been noted, the type of waste Chem-Met receives should be monitored by permit conditions or by participating in the Department's preapproval system. This would involve making a list of materials that should not be processed by Chem-Met and restricting the concentration or volume of others. It would be up to staff to make such determination by considering the type of waste and whether there exists a more effective means of disposal.

MEL:mh

Attachments

TABLE 1

This Table lists the individual components of the Chem-Met process as given in Figure 1 with the type of emissions expected to be associated with it.

Component No.	Type of Emission Associated With It
1	Evaporative emissions of freon, methylene chloride solvents, and sulfuric acid.
2	Potential for emission of lime flue dust which contains calcium oxide, a powerful caustic to living tissue. Is controlled by a baghouse.
3	Addition of lime flue dust is uncontrolled, may result in emission of calcium oxide.
4	Volitalization of liquid waste to atmosphere as the result of reaction temperature of 245°F.
5	Fugitive emission of reacted mixture which contains calcium oxide and others. There is evidence that asbestos and halogenated flame retardants are also here.
6	Evaporative emissions of solvents directly from ponds or from de-absorption from the chem-pack material. High odor area.
7	Evaporative emissions of solvents, high odor area.

TABLE 2

Miscellaneous Waste

This is a partial listing of some of the miscellaneous wastes approved to be processed at Chem-Met Services by the Oil and Hazardous Material Control Section of the Water Quality Division. It should be kept in mind that this is not necessarily representative of the majority of wastes being received here, it is just a sample taken from Water Quality's files.

Approval Date	Generator	Gallons	Waste Components
2/15/78	BASF	500/mon.	Polyether polyols, trichlorofluoromethane, methylene chloride, halogenated flame retardants, alphatic amines, TDI, tris.
1979	Ash Stevens	24,000/mon.	98.5% water, 1.5% methanol, ethanol, propanol, acetic acid, formic acid.
1979	BASF	-----	Halogenated flame retardants, alphatic amines, solvents, Freon II, methylene chloride.
1979	BASF	----	99% water, .78% polyurethane, .18% toluene.
1979	Thomas Solvent	----	25% toluene, xylene, mineral spirits, trace perchloroethylene, trichloroethylene.
1979	Kelsey-Hayes	----	85% water, 7.2% xylene
1979	Lindberg Heat Treating	----	6% sulfuric acid, 10% Fe, 84% water
1979	Penwalt	----	75% sulfuric acid, 25% water

TABLE 2

(continued)

Approval Date	Generator	Gallons	Waste Components
1979	TRW Electronics	----	10% hydrochloric acid, 90% water
1979	Thetford Corp.	----	37% formaldehyde, 12% methyl alcohol
1979	Fisher Body	----	5-33% toluene, 2-11% ethyl alcohol, 3-100% xylene, 1-16% MEK, 9-30% aromatic naptha, 0-25% diethylbenzene, 1-15% isopropyl alcohol
4/14/80	Chrysler	----	30-70% fatty acids, 5-15% rubber, 10-25% resins, 1-20% solvents and oil.
4/14/80	Chrysler	----	< .01% thioureas, < 3% asbestos, < 10% pherolic resin, <.001% hydroquinone
4/14/80	Chrysler	----	2-20% water, 15-70% solvent, 1-10% asbestos, 10-30% paint sealer
4/14/80	Chrysler	55/mon.	1-10% pigment, 10-25% resin, 5-25% alcohol, ester, glycols, 1-10% solvent
4/14/80	Chrysler	----	50-95% oil, 5-25% glycol, 5-15% emulsifier, 5-35% water, <10% trisodium phosphate <6% sulfonates, sulfates
4/14/80	Chrysler	440/wk.	<1% chlorine, <10% asbestos, <5% P, <30% Zn, <1% Pb, solvents, oils, Flash point 0°F - 104°F.
4/14/80	Chrysler	115,000	62% paint, 38% water

TABLE 3

A. Composition of Metallurgic Limestone Flue Dust

Component	%
CaO	59
Loss on ignition	29
SiO_2	3.64
Al_2O_3	1.38
Fe_2O_3	1.1
S	1.07
MgO	.68
TiO_2	.116
P_2O_5	.04
Mn	.011

B. Primary Chem-Met Process Reactions

1. $H_2SO_4 + CaO \longrightarrow CaSO_4 + H_2O$
2. $CaO + H_2O \longrightarrow Ca(OH)_2$

FIGURE 1

CHEM-MET SERVICES, INC., WYANDOTTE

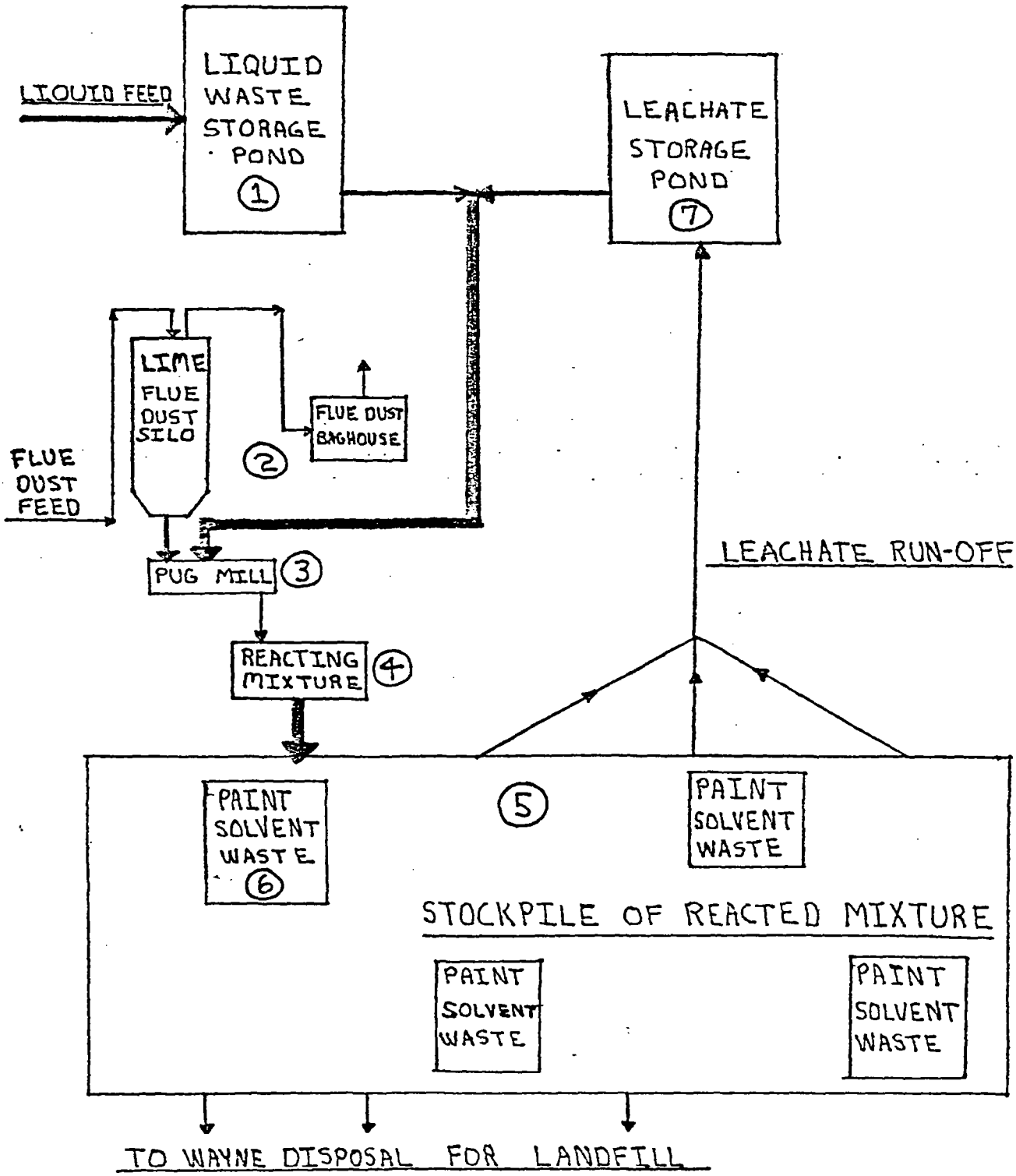
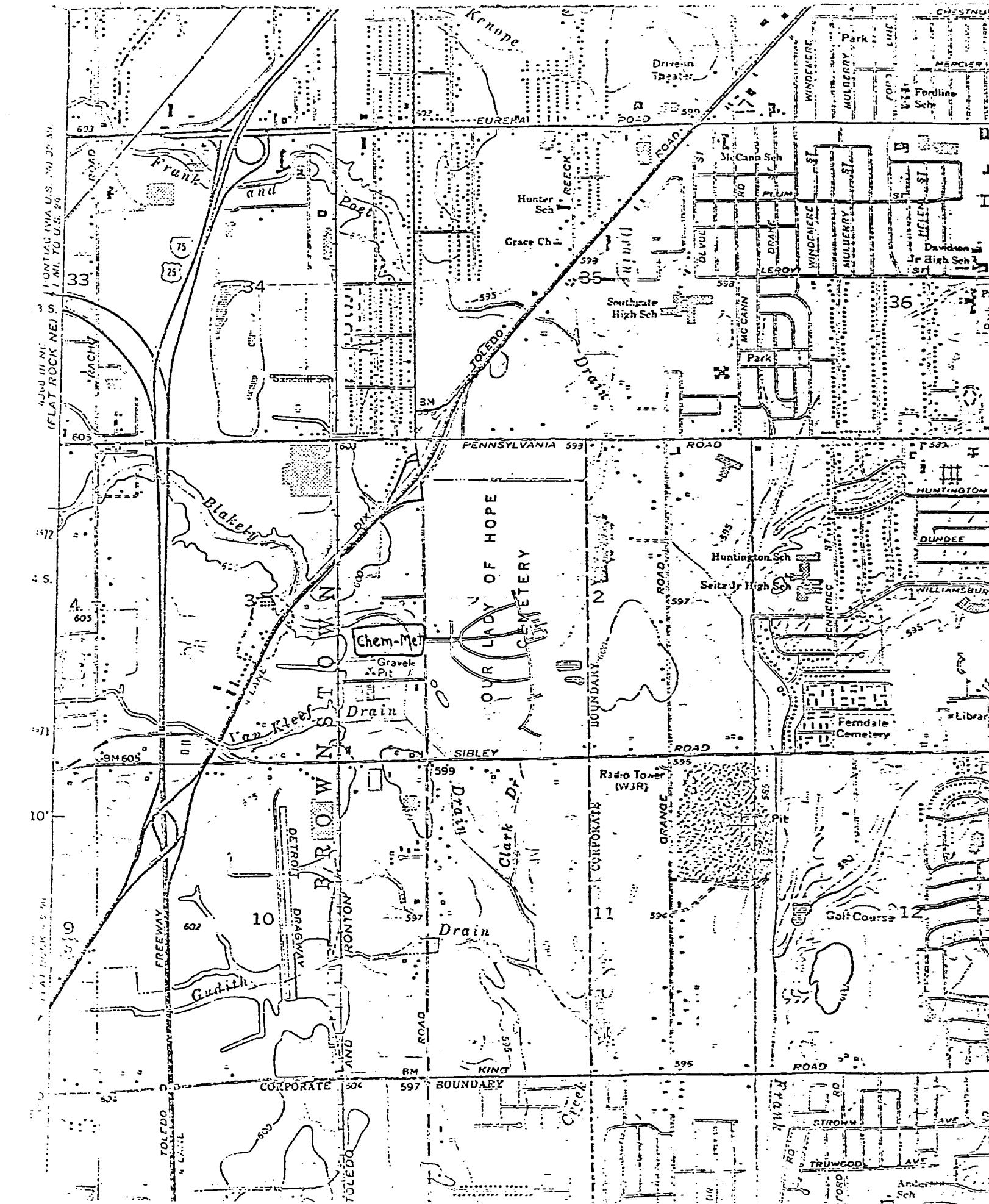


FIGURE 2


Kenope
Drive-in Theater
EUREKA ROAD
Park
Ford Line Sch
Frank and Poet
Hunter Sch
REECK ROAD
McCann Sch
PLUM
Grace Ch
LEROY
WINDEMERE
MULBERRY
Davidson Jr High Sch
Southgate High Sch
McCANN
Park
TOLEDO
Drain
Sandhill Sch
PENNSYLVANIA ROAD
HUNTINGTON
DUNDEE
Huntington Sch
Seitz Jr High Sch
WILLIAMSBURG
Blakely
Chem-Met
Gravel Pit
OUR LADY OF HOPE CEMETERY
Van Kleef Drain
SIBLEY ROAD
Ferndale Cemetery
Radio Tower (WJR)
Pit
Golf Course
Clark Dr.
Drain
Gudith Drain
FREEWAY
DETROIT
DRAGWAY
IRONTON
ROW
CORPORATE BOUNDARY
KING ROAD
Creek
TOLEDO
TRUWOOD AVE
Anderson Sch
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